

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
25 April 2002 (25.04.2002)

PCT

(10) International Publication Number
WO 02/32595 A1

- (51) International Patent Classification⁷: B21C 23/00, 43/00
- (74) Agent: LEWIS, David, Overington; BWE Limited, Beaver Road Industrial Estate, Ashford, Kent TN23 7SH (GB).
- (21) International Application Number: PCT/GB00/04036
- (22) International Filing Date: 19 October 2000 (19.10.2000)
- (81) Designated States (*national*): AU, CA, CN, IN, JP, RU, US, ZA.
- (25) Filing Language: English
- (84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).
- (26) Publication Language: English
- (71) Applicant (*for all designated States except US*): BWE LIMITED [GB/GB]; Beaver Road Industrial Estate, Ashford, Kent TN23 1SH (GB).
- Published:
— with international search report
- (72) Inventor; and
- (75) Inventor/Applicant (*for US only*): HAWKES, Daniel, John [GB/GB]; Gorsewood, Woodchurch Road, Shadoxhurst, Ashford, Kent TN26 1LR (GB).
- For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*



WO 02/32595 A1

(54) Title: METHOD AND APPARATUS FOR PRODUCTION OF A CONTINUOUSLY EXTRUDED PRODUCT

(57) Abstract: Continuous extrusion means in which aluminium or copper feedstock with a nominal diameter approximately 4% greater than the width of the circumferentially extending groove in a continuous extrusion wheel is fed from a feed reel to a centreless lathe or shaving machine set to machine the feedstock to a diameter corresponding to the width of the groove. In thereby removing the surface layer, surface impurities are removed and feedstock with a clean, non-oxidised surface is delivered directly to the groove without the intervention of feed rollers liable to cause distortions in the feedstock whilst ensuring that substantially constant forces arise between the machined-to-size feedstock and the walls of the groove. This reduces any tendency of irregular feed toward the associated abutment and thus enhances the constancy of the product quality as well as avoiding problems arising from oxidation and/or surface imperfections.

**TITLE: METHOD AND APPARATUS FOR PRODUCTION OF A
CONTINUOUSLY EXTRUDED PRODUCT**

5

DESCRIPTION

This invention relates to a method of and apparatus for the production of a continuously extruded product. EP 071490 describes the production of a continuously extruded product including a feed reel means arranged to supply feedstock generally of substantially circular cross-section to a circumferentially extending groove in a wheel.

According to one aspect of the present invention machining means are positioned to receive feedstock from the feed reel means and to discharge machined feedstock to the circumferentially extending groove, with the machining means being arranged to remove at least a surface layer from the feedstock and form a circular cross-section dimensioned as a close fit within the circumferentially extending groove.

Preferably the machining means include a centreless lathe.

20

Alternatively, the machining means includes a shaving head.

Desirably, drive motors for the feed reel, the machining means and the wheel are electronically linked such that the speed of the feed reel and the speed of the machining means are adjusted in accordance with the speed of the wheel.

25

According to another aspect of the present invention, there is provided a method of production of a continuous extrusion product including supplying feedstock of substantially generally circular cross-section from a feed reel to machining means, machining the feedstock to remove at least a surface layer and form a circular cross section feed dimensioned as a close fit within the circumferentially extending groove, feeding the machined feedstock directly from the machining means to the circumferentially extending groove and driving the wheel carrying the machined feedstock around in the circumferentially extending groove to contact an abutment and discharge through a die to form an extruded product.

30
35

Preferably, the feedstock is of aluminium.

40

Alternatively the feedstock is copper.

Desirably, the machining means operates to a tolerance of $\pm 0.1\text{mm}$ on a typical diameter of 12.7mm of feedstock.

45

In one embodiment, the extrusion plant includes, in in-line series, a feed reel means, machining means, a continuous extrusion machine and a product take-up reel.

50

The feed reel means includes an electric drive motor and is arranged to deliver aluminium feedstock in the form of an approximately circular cross-section aluminium wire rod through guide rollers to a centreless lathe having an electric drive motor.

55

The centreless lathe is positioned closely adjacent the continuous extrusion machine and delivers machined feedstock directly to a parallel sided circumferentially extruding groove formed on the rotating wheel of the continuous extrusion machine driven by an electric motor.

60

The continuous extrusion machine discharges extruded product from a die connected through a passage in a die body mounted adjacent an abutment extending into the circumferentially extending groove and delivers the extruded product to the product take-up reel driven by an electric motor.

65

Respective electronic speed control means are associated with each of the electric motors with the speeds at the feed reel, of the centreless lathe and at the take-up reel being electronically linked to the speed of rotation of the rotating wheel of the continuous extrusion machine.

70

In operation, aluminium feed stock with a nominal diameter to $\pm 0.2\text{mm}$, or 4% (i.e. approximately 2mm) greater than the width, axially of the wheel, of the groove, is fed from the feed reel to the centreless lathe which is set to machine the feedstock to a diameter corresponding to the width of the groove thereby removing a surface layer from the feedstock. In removing the surface layer, surface impurities are removed and

75 feedstock with a clean, non-oxidised, surface is delivered directly to the groove without
intervention of feed rollers liable to cause distortions in the feedstock whilst at the same
time ensuring substantially constant forces arising at the walls of the groove between
the feedstock, which has been machined to close tolerances, and the walls of the
80 groove. This reduces any tendency toward irregular feed of the feedstock around the
groove toward the abutment and thus enhances the constancy of the product quality
arising from extrusion as well as avoiding problems with oxidation and/or surface
imperfections inherent in separating the two processes.

85 It will be apparent that metals other than aluminium, such as copper, may be
utilised as feedstock and that the extrusion product may be delivered at a controlled
rate as cut-to-length bar stock rather than being wound on to a take-up reel.

90

Claims

1. Continuous extrusion means including a feed reel means
5 arranged to supply feedstock generally of substantially
circular cross-section to a circumferentially extending
groove in a wheel, characterised in that machining means
are positioned to receive feedstock from the feed reel
means and to discharge machined feedstock to the
10 circumferentially extending groove, with the machining
means being arranged to remove at least a surface layer
from the feedstock and form a circular cross-section
dimensioned to be a close fit within the circumferentially
extending groove.
- 15
2. Continuous extrusion means as claimed in Claim 1,
characterised in that the machining means includes a
centreless lathe.
- 20
3. Continuous extrusion means as claimed in Claim 1,
characterised in that the machining means includes a
shaving head.
- 25
4. Continuous extrusion means as claimed in Claim 1,
Claim 2 or Claim 3, characterised in that drive motors for
the feed reel, the machining means and the wheel are
electronically linked such that the speed of the feed reel
and the speed of the machining means are adjusted in
accordance with the speed of the wheel.
- 30
5. A method of production of a continuous extrusion
product including supplying feedstock generally of
substantially circular cross-section from a feed reel to
machining means, machining the feedstock to remove at least
35 a surface layer and form a circular cross-section feed
dimensioned to be a close fit within a circumferentially

5 extending groove in a wheel, feeding the machined feedstock directly from the machining means to the circumferentially extending groove and driving the wheel carrying the machined feedstock around in the circumferentially extending groove to contact an abutment and discharge through a die to form an extruded product.

10 6. A method of production of a continuous extrusion product as claimed in Claim 5, characterised in that the feedstock is of aluminium.

15 7. A method of production of a continuous extrusion product as claimed in Claim 5, characterised in that the feedstock is of copper.

20 8. A method of production of a continuous extrusion product as claimed in Claim 5, Claim 6 or Claim 7, characterised in that the machining means operates to a tolerance of $\pm 0.1\text{mm}$ on a typical diameter of 12.7mm of feedstock.

25

30

35